

# **Analysis of the Overlap between Priority Habitat Management Areas and Existing and Potential Energy Development across the Western United States**

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**Final Report**

**June 9, 2017**



**Prepared for:**

**Backcountry Hunters & Anglers**

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## EXECUTIVE SUMMARY

Greater sage-grouse have experienced range-wide population declines, and many monitored populations have declined on average about 1% per year since 1965. Decline in greater sage-grouse populations has been attributed to degradation and loss of sagebrush habitats from disturbance factors, including agricultural conversion, invasions of exotic plants leading to increased fire frequencies, and energy development. The US Fish and Wildlife Service (USFWS) determined in 2010 that listing the sage-grouse under the Endangered Species Act was warranted due to habitat loss and fragmentation and inadequacy of regulatory mechanisms governing activities that contributed to habitat loss and fragmentation. On September 22, 2015 the USFWS determined that protection of the sage-grouse under the Endangered Species Act was not warranted primarily because current conservation practices and state and federal conservation plans significantly addressed the threats throughout their range. One of those conservation practices was the Records of Decision to 98 Bureau of Land Management (BLM) and US Forest Service (USFS) land resource management plans in September 2015. These plans consist of a layered management approach that is based on key habitats mapped within individual states. Of primary importance is sage-grouse Priority Habitat Management Areas (PHMA) identified in each state on BLM and USFS federal split estate and minerals (federal lands).

The objectives of this study were twofold:

1. to evaluate the overlap between the PHMA and existing coal and oil and gas authorized leases on federal lands; and
2. to analyze the assumed development potential derived from publicly available data for oil and gas on federal lands within the PHMA and compare that to the development potential for lands outside of the PHMA.

We restricted our analysis to seven states that include 97% of the PHMA: Colorado, Idaho, Montana, Nevada, Oregon, Utah and Wyoming. We acquired energy development leases from the BLM's Land and Mineral Legacy Rehost 2000 System (LR2000) and used this information to calculate acreages and percentages included in this study.

The principal findings of this analysis are as follows:

- **There is 4% overlap between the PHMA and existing coal and oil and gas leases on federal lands.**
- **The majority of federal lands within the PHMA have zero to low assumed potential for oil and gas development based on existing data sources.** For oil and gas, approximately 79% of federal lands and minerals within the PHMA have zero to low assumed development potential.

- **The majority of federal lands and minerals identified as assumed medium or high development potential for oil and gas are located outside of the PHMA.** For oil and gas, approximately 71% of all federal lands and minerals within the study area with assumed medium to high development potential are located outside of the PHMA.

## **REPORT REFERENCE**

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## INTRODUCTION

Greater sage-grouse (*Centrocercus urophasianus*) occur in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, Wyoming, and Canada, and occupy about 56% of their historical pre-settlement range (Schroeder et al. 2004). Greater sage-grouse (hereafter sage-grouse) have experienced range-wide population declines, and many monitored populations have declined approximately 1% per year since 1965 (Western Association of Fish and Wildlife Agencies 2015). Garton et al. (2011) projected that 75% of populations and 29% of the seven management zones in the US are likely to decline below effective population sizes of 500 within 100 years if current conditions and trends persist.

The decline in sage-grouse populations has been attributed to loss and degradation of sagebrush habitats (Knick et al. 2003 and Connelly et al. 2004) from disturbance factors, including agricultural conversion (Swenson et al. 1987, Connelly et al. 2004), invasions of exotic plants leading to increased fire frequencies (Knick et al. 2003, Connelly et al. 2004), and energy development (Naugle et al. 2011, Gregory and Beck 2014, LeBeau et al. 2017). Sage-grouse are a sagebrush obligate species (Braun et al. 1977), entirely dependent on healthy, contiguous sagebrush habitats for successful reproduction and survival (Schroeder et al. 1999, Connelly et al. 2004). Fragmentation and degradation of sagebrush habitats inhibit sage-grouse productivity and survival, which have long-term impacts on affected sage-grouse populations. Understanding current threats and potential new threats to sage-grouse populations is imperative to the viability and conservation of this species.

The US Fish and Wildlife Service (USFWS) determined in 2010 that listing the sage-grouse under the Endangered Species Act was warranted due to habitat loss and fragmentation and inadequacy of regulatory mechanisms that govern activities leading to such habitat loss and fragmentation. On September 22, 2015 the USFWS determined that protection of the sage-grouse under the Endangered Species Act was not warranted primarily because current conservation practices and state and federal conservation plans significantly addressed threats throughout their range. One of those conservation practices was the Records of Decision to 98 Bureau of Land Management (BLM) and Forest Service (USFS) land resource management plans (RMP) in September 2015. These plans consist of a layered management approach that is based on key habitats mapped within individual states and includes Sagebrush Focal Areas that are habitats with the highest level of protection, Priority Habitat Management Areas (PHMA) where new habitat disturbance is limited or eliminated with limited exceptions, and General Habitat Management Areas that require some special management but is more flexible (BLM and USFS 2015). More specifically, PHMA were identified because they contain large, undisturbed expanses of breeding habitat and the highest densities of sage-grouse (USFWS 2015). There are three main objectives for conserving and protecting sage-grouse habitat associated with these plans; minimize new or additional surface disturbance, improve habitat condition, and reduce threat of rangeland fire to sage-grouse and sagebrush habitat (BLM and USFS 2015).

The purpose of this study was to 1) evaluate the overlap between the PHMA and existing coal and oil and gas leases on BLM and USFS federal lands and split estate and minerals (federal lands), and 2) analyze the assumed development potential for oil and gas on federal lands within the PHMA and compare that to assumed development potential for lands and minerals outside of the PHMA.<sup>1</sup> More specifically, we delineated leases and identified development potential based on existing data to provide further insight into future development scenarios.

## STUDY AREA

The PHMA overlap 11 states and seven sage-grouse management zones. We restricted our analysis to states with federal lands that encompassed 97% of the entire PHMA: Colorado, Idaho, Montana, Nevada, Oregon, Utah, and Wyoming (hereafter study area; Figure 1). The largest percentage of the PHMA occur in Wyoming (25.7%), followed by Nevada (20.7%; Table 1).

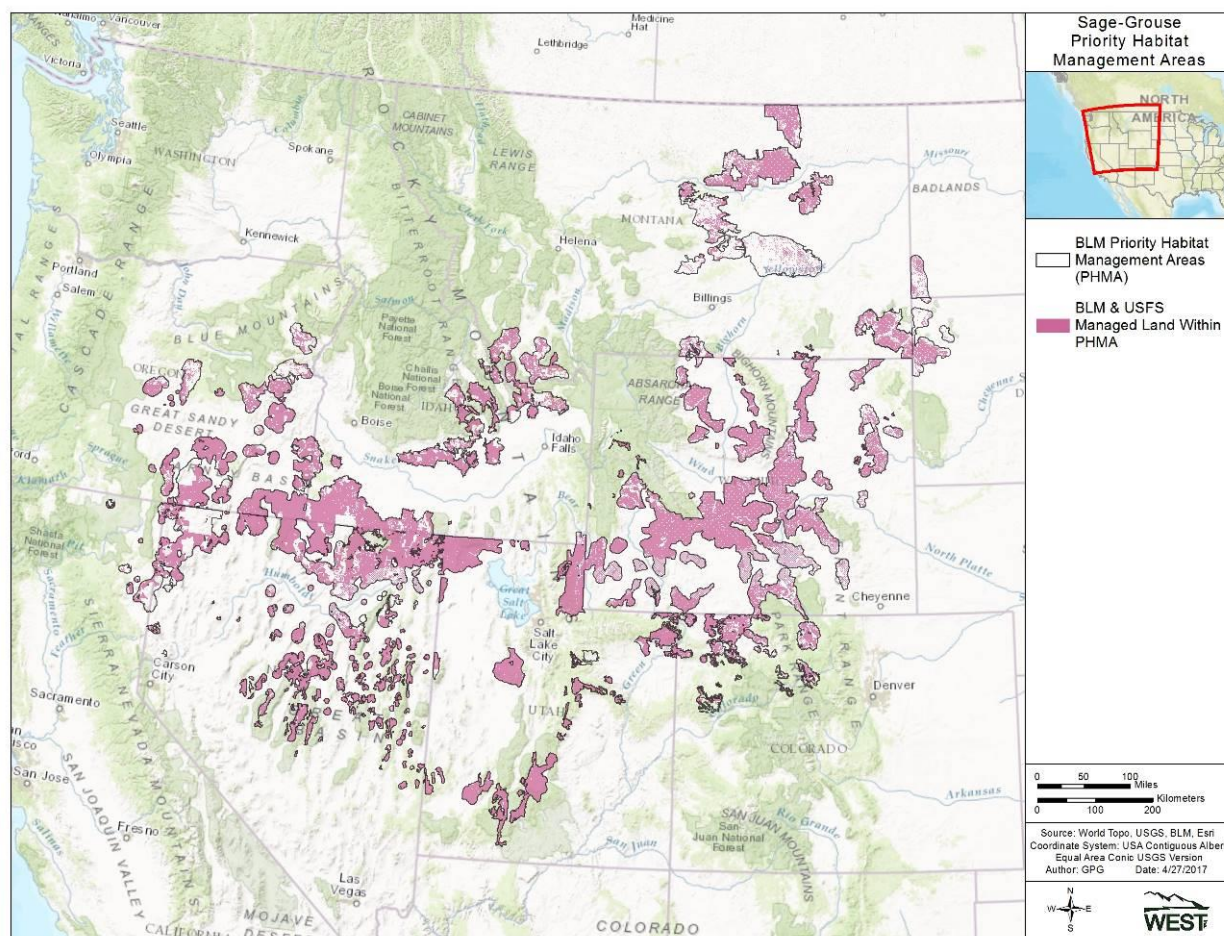
**Table 1. Distribution of sage-grouse Priority Habitat Management Areas (PHMA) and federal lands and split mineral estates within the range of sage-grouse.**

State	Entire PHMA		Federal Lands and Minerals Within PHMA	
	Acres	% of Total	Acres	% of PHMA
Colorado	2,361,969	4.0%	1,666,933	70.6%
Idaho	5,991,716	10.1%	4,480,291	74.8%
Montana	9,348,774	15.7%	4,937,015	52.8%
Nevada <sup>1</sup>	12,347,835	20.7%	9,243,501	74.9%
Oregon	6,663,572	11.2%	4,954,242	74.3%
Utah	5,532,839	9.3%	5,237,048	94.7%
Wyoming	15,272,272	25.7%	11,869,640	77.7%
<b>Study Area Subtotal</b>	<b>57,518,977</b>	<b>96.6%</b>	<b>42,388,670</b>	<b>73.7%</b>
California	557,608	0.9%	275,488	49.4%
North Dakota <sup>1</sup>	461,931	0.8%	171,582	37.1%
South Dakota <sup>1</sup>	984,793	1.7%	415,187	42.2%
<b>Total</b>	<b>59,523,309</b>	<b>100.0%</b>	<b>43,250,927</b>	<b>72.7%</b>

<sup>1</sup>Federal lands do not include federal minerals

<sup>1</sup> Development potential for coal was not available.





**Figure 1. Bureau of Land Management Priority Habitat Management Areas and federal lands and split mineral estates within the study area.**

## METHODS

We acquired authorized leases and from the BLM's Land and Mineral Legacy Rehost 2000 System (LR2000; BLM 2011). The LR2000 is a searchable database for public reports on BLM land and mineral use authorizations, conveyances, mining claims, withdraws and classifications (BLM 2011). We generated a geographic report that identified all authorized federal leases within the study area and we then determined which of those leases occurred on federal lands.

In addition to identifying existing energy development leases, we collected information on assumed oil and gas development potential within and outside of the PHMA within the study area. While it is difficult to consistently predict where new development may occur, especially fluid and other extractable minerals, we utilized existing publicly available data sources to determine assumed development potential for oil and gas. We obtained information regarding potential for oil and gas development from Copeland et al. (2009) where spatially-explicit predictive modeling techniques were used across parts of the intermountain west to develop oil

and gas development potential. This data layer had model predictions scaled from zero (low oil and gas potential) to 100 (high potential; Copeland et al. 2009). We quantified the predictions into four development-potential categories: very low (0-25), low (26-50), medium (51-75), and high (76-100) oil and gas potential (Copeland et al. 2009). We extracted these predictions within PHMA to estimate potential for oil and gas development within PHMA on federal lands. Areas within PHMA without any development potential were areas where models could not predict development potential due to the lack of geological features important for oil and gas development (Copeland et al. 2009). This suggests that areas without predictions have zero potential for development.

We calculated authorized leased acres for each development type and oil and gas development potential in ArcMap 10.3 (ArcMap 2016). We then calculated percentages by summing acres within the PHMA by state and development type and then dividing by total acres of federal lands that exist within the PHMA by state.

## **RESULTS**

### **Oil and Gas Development**

Oil and gas leases occur within PHMA in all states within the study area except Idaho (Table 2, Figure 2). Wyoming has the largest number of oil and gas leases on federal lands within the PHMA (3,005), which cover 1,696,830 acres (11.1%) of the PHMA within Wyoming (Table 2). Colorado has the second largest amount of leased acreage (365,792 acres) within the PHMA and accounted for 15.5% of the PHMA within Colorado. Overall, 4.2% of federal lands within the PHMA are leased for oil and gas development (Table 2).

Assumed oil and gas development potential within the PHMA within four states was classified as zero or very low – Idaho (99.5%), Nevada (98.6%), Oregon (99.9%), and Utah (79.1%) – according to the model developed by Copeland et al. 2009 (Table 3, Figure 3). Colorado and Wyoming have the highest percentage of high oil and gas assumed development potential within the PHMA (34.1% and 31.9%, respectively; Table 3). Overall, 78.8% of federal lands occurring within the PHMA have zero to low potential for oil and gas development (Table 3).

**Table 2. Oil and gas leases that occurred on federal lands and split mineral estates within the Priority Habitat Management Areas within the study area, extracted from the LR2000 database, April 2017.**

State	Count	Leased	% of PHMA
		Acres	
Colorado	722	365,792	15.5%
Idaho	0	-	-
Montana	139	55,194	0.9%
Nevada <sup>1</sup>	134	154,565	1.3%
Oregon	4	2,622	0.0%
Utah	166	119,665	2.2%
Wyoming	3,005	1,696,830	11.1%
<b>Study Area Subtotal</b>	<b>4,170</b>	<b>2,394,668</b>	<b>4.2%</b>
California	0	-	-
North Dakota	225	83,382	18.1%
South Dakota	0	-	-
<b>Total</b>	<b>4395</b>	<b>2,478,050</b>	<b>4.2%</b>

<sup>1</sup>Federal lands only

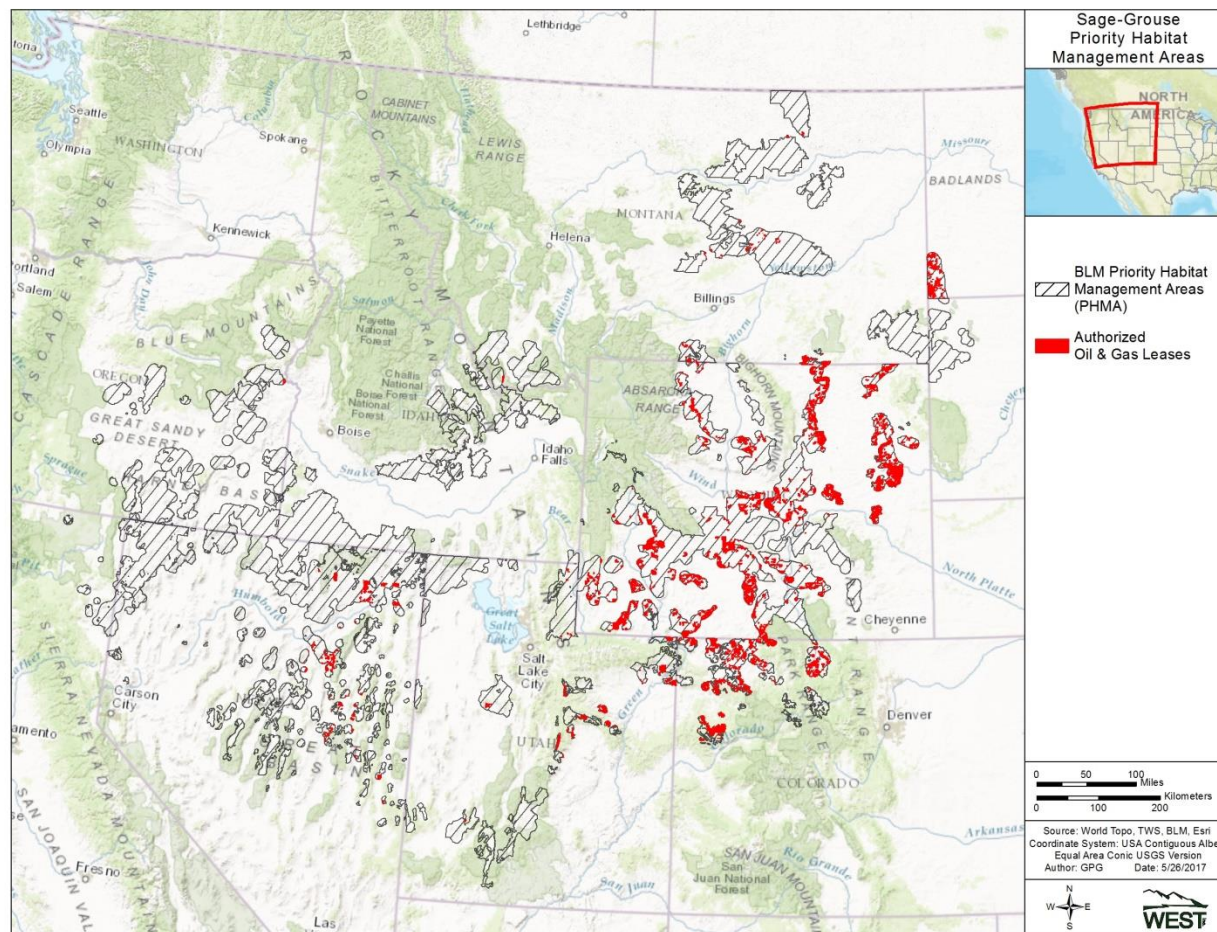


Figure 2. Oil and gas leases that occur on federal lands and split mineral estates within the Priority Habitat Management Areas, extracted from the LR2000 database, April 2017.

**Table 3. Assumed oil and gas development potential on federal lands and split mineral estates within the Priority Habitat Management Areas (derived from Copeland et al. 2009).**

State	Zero		Very Low		Low		Medium		High	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Colorado	935	0.1%	619,186	37.1%	173,208	10.4%	305,667	18.3%	567,936	34.1%
Idaho	4,443,089	99.2%	14,853	0.3%	17,770	0.4%	4,579	0.1%	0	-
Montana	900,715	18.2%	1,888,590	38.3%	796,853	16.1%	911,478	18.5%	439,378	8.9%
Nevada <sup>1</sup>	1,353,554	14.6%	7,762,229	84.0%	22,704	0.2%	105,014	1.1%	0	-
Oregon	2,892,318	58.4%	2,055,288	41.5%	3,172	0.1%	3,464	0.1%	0	-
Utah	42,568	0.8%	4,102,513	78.3%	192,149	3.7%	305,189	5.8%	594,628	11.4%
Wyoming	2,883	<0.05%	4,247,234	35.8%	1,871,746	15.8%	1,956,094	16.5%	3,791,683	31.9%
<b>Study Area Subtotal</b>	<b>9,636,062</b>	<b>22.7%</b>	<b>20,689,893</b>	<b>48.8%</b>	<b>3,077,602</b>	<b>7.3%</b>	<b>3,591,485</b>	<b>8.5%</b>	<b>5,393,625</b>	<b>12.7%</b>
California	266,246	96.6%	9,242	3.4%	0	-	0	-	0	-
North Dakota	59	<0.05%	82,468	48.1%	2,797	1.6%	12,223	7.1%	74,034	43.1%
South Dakota	126	<0.05%	236,006	56.8%	128,184	30.9%	42,324	10.2%	8,546	2.1%
<b>Overall</b>	<b>9,902,492</b>	<b>22.9%</b>	<b>21,017,608</b>	<b>48.6%</b>	<b>3,208,585</b>	<b>7.4%</b>	<b>3,646,033</b>	<b>8.4%</b>	<b>5,476,205</b>	<b>12.7%</b>



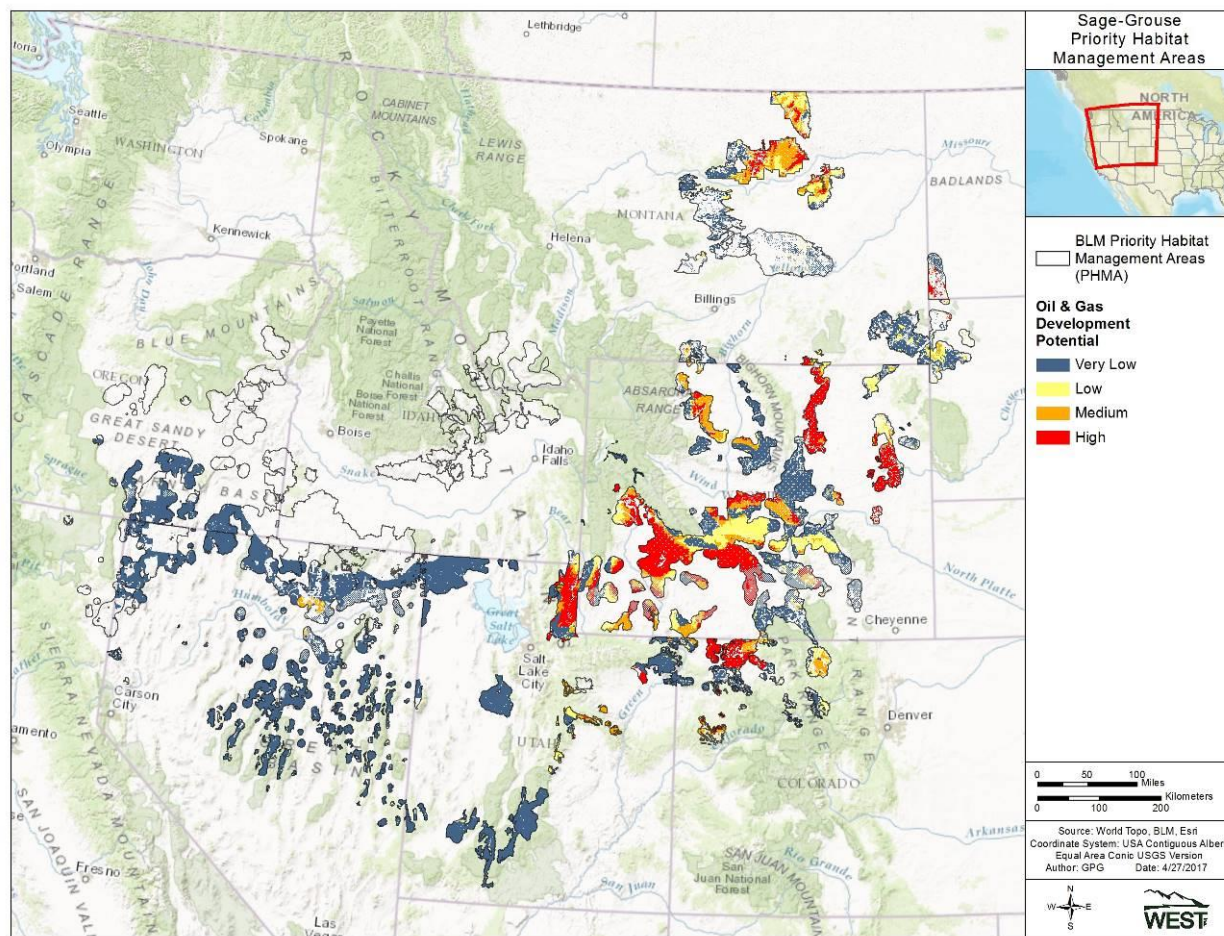


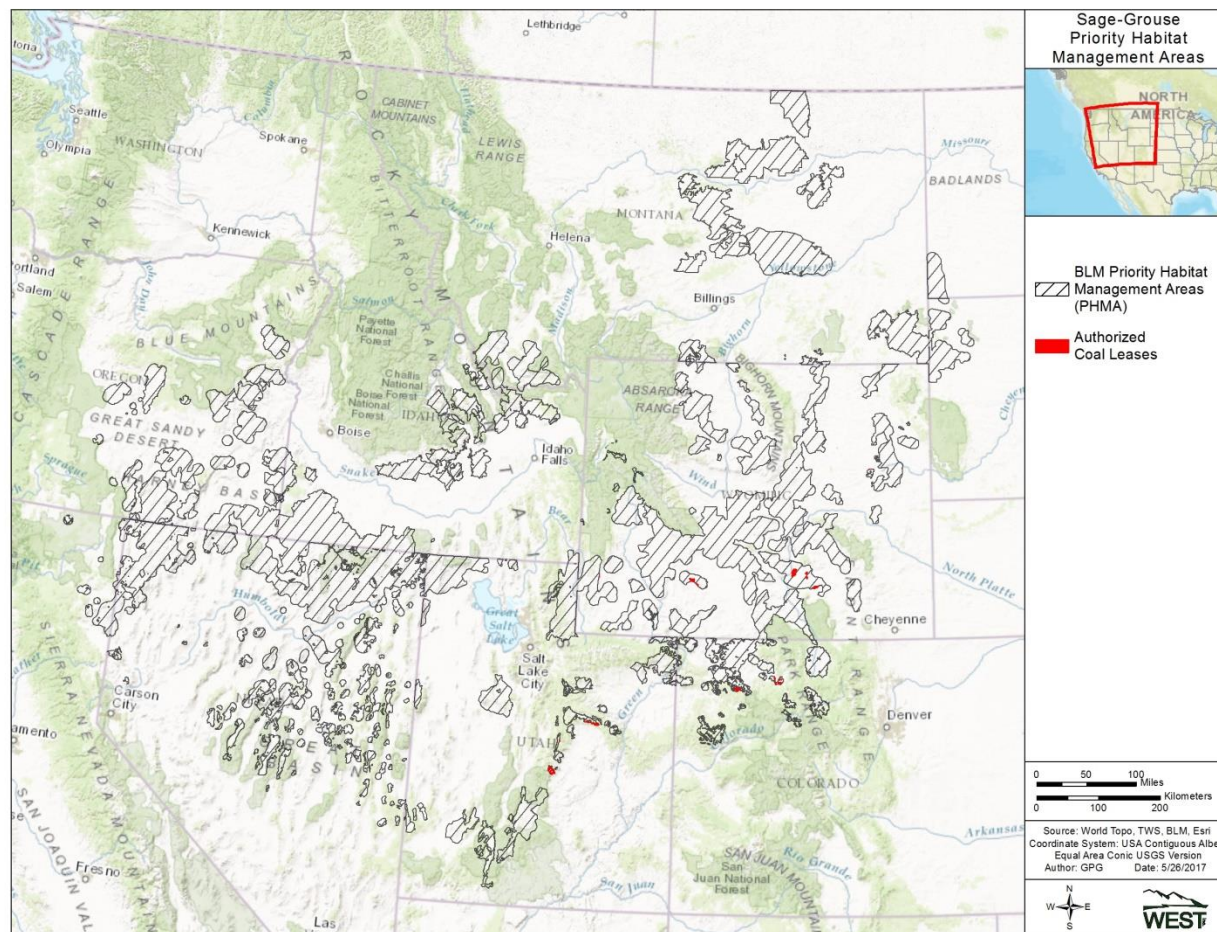
Figure 3. Oil and gas energy development potential that occur on federal lands and split mineral estates within the Priority Habitat Management Areas (derived from Copeland et al. 2009).

## Coal Mining

Three states within the study area have coal leases that exist on federal lands within the PHMA (Table 4, Figure 4). Wyoming has the most acres leased on federal lands within PHMA (21,473 acres), followed by Utah (18,514 acres) and Colorado (12,517 acres; Table 4).

**Table 4. Coal leases that occur on federal lands and split mineral estates within Priority Habitat Management Areas, extracted from the LR2000 database, April 2017.**

State	Count	Leased	
		Acres	% of PHMA
Colorado	24	12,517	0.53%
Idaho	0	-	-
Montana	0	-	-
Nevada <sup>1</sup>	0	-	-
Oregon	0	-	-
Utah	29	18,514	0.33%
Wyoming	23	21,473	0.14%
<b>Study Area Subtotal</b>	<b>76</b>	<b>52,504</b>	<b>0.09%</b>
California	0	-	-
North Dakota	0	-	-
South Dakota	0	-	-
<b>Overall</b>	<b>76</b>	<b>52,504</b>	<b>0.09%</b>



**Figure 4. Coal leases that occur on federal lands and split mineral estates within Priority Habitat Management Areas, extracted from the LR2000 database, April 2017.**



## **CONCLUSION**

PHMA were identified to assist the BLM and USFS prioritizing areas for the protection, conservation, and enhancement of sage-grouse habitat. Based on our analysis, oil and gas development appears to be the most widespread energy development activity within the PHMA, due to its large spatial distribution. However, only 4.2% of federal lands within the PHMA currently contain oil and gas leases. Overall, 3.95%<sup>2</sup> of federal lands within the PHMA have been leased for oil and gas and coal energy development. Wind energy development energy occurs across the study area; however, in general, wind energy is excluded within PHMA in the revised RMP. As such, we did not analyze the overlap between wind energy development right-of-ways and PHMA.

Most federal lands within the PHMA are assumed to have zero or very low assumed potential for oil and gas energy development, based on available data we used. There is a higher percentage of federal lands and minerals with medium and high development potential for oil and gas outside of the PHMA than within the PHMA (71% Appendix A and Table 3). The RMP require the BLM to prioritize energy development leasing outside of the PHMA and based on this analysis there is assumed high potential for oil and gas energy development to occur outside of the PHMA compared to within. In addition, while the BLM prioritizes energy development outside of the PHMA, development can occur with PHMA where surface disturbance caps are not exceeded.

The assumed energy development potential data provides an estimate or index for future energy development and does not account for other factors that might influence that development, such as supporting infrastructure or land acquisition.

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<sup>2</sup> This excludes overlapping oil and gas and coal leases.

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**Appendix A. Assumed Oil and Gas Energy Development Potential Outside of the Priority  
Habitat Management Areas Occurring on Federal Lands and Minerals  
Within the Study Area**

**Appendix A. Assumed oil and gas energy development potential on federal lands and split mineral estates outside of Priority Habitat Management Areas within the study area (Copeland et al. 2009).**

State	Zero		Very Low		Low		Medium		High	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Colorado	4,801	<0.05%	24,764,786	82.6%	1,734,334	5.8%	1,798,161	6.0%	1,682,762	5.6%
Idaho	22,745,366	88.0%	3,103,133	12.0%	4,934	<0.05%		0.0%		0.0%
Montana	19,653,655	53.5%	10,735,041	29.2%	2,701,704	7.4%	1,660,032	4.5%	2,005,099	5.5%
Nevada	742,134	1.9%	38,411,236	97.4%	76,709	0.2%	195,510	0.5%	1,736	<0.05%
Oregon	22,214,982	82.4%	4,338,522	16.1%	32,683	0.1%	370,205	1.4%		0.0%
Utah	6,643	<0.05%	36,289,255	85.3%	1,732,182	4.1%	2,399,446	5.6%	2,105,128	4.9%
Wyoming	170,285	0.6%	17,755,499	57.8%	2,601,151	8.5%	2,614,140	8.5%	7,593,066	24.7%
<b>Overall</b>	<b>65,537,866</b>	<b>28.2%</b>	<b>135,397,472</b>	<b>58.3%</b>	<b>8,883,697</b>	<b>3.8%</b>	<b>9,037,494</b>	<b>3.9%</b>	<b>13,387,791</b>	<b>5.8%</b>